IS 2720-18 (1992): Methods of test for soils, Part 18: Determination of field moisture equivalent [CED 43: Soil and Foundation Engineering]

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IS 2720 (Part 18) : 1992
(Reaffirmed 2002)

भारतीय मानक

मृदा परीक्षण पद्धतियाँ

भाग 18 फील्ड-नमी का समतुल्य ज्ञात करना

(पहला पुनरीक्षण)

Indian Standard

METHODS OF TEST FOR SOILS

PART 18 DETERMINATION OF FIELD MOISTURE EQUIVALENT

(First Revision)

UDC 624·131·377·620·176

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 1992

Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Soils and Soil Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

With a view to establishing uniform procedures for the determination of different characteristics of soils and also for facilitating a comparative study of the results, an Indian Standard Methods of test for Soils (IS 2720) has been published in 41 parts. This part deals with the method of test for determination of field moisture equivalent of soils, which gives an indication of the percentage moisture at which a drop of water placed on a smooth surface of soil pat will not be immediately absorbed but will spread out over the surface and give it a shining appearance. In fine-grained soils, the test assists in the determination of the moisture content at which air in the interstices between particles becomes sealed in by the moisture films around individual particles so that the capillary forces can no longer draw moisture into the soil. In coarse-grained soils, the test indicates that all voids in the material are filled with water. A field moisture equivalent equal to or greater than the centrifuge equivalent indicates the presence of organic material in deterimental quantities.

This standard was first plubished in 1964. In this first revision apart from general updation, the amendment has been incorporated and all quantities/dimensions have been given in SI units.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHODS OF TEST FOR SOILS

PART 18 DETERMINATION OF FIELD MOISTURE EQUIVALENT

(First Revision)

1 SCOPE

This standard (Part 18) lays down a method for determining the field moisture equivalent of soils.

2 REFERENCES

The Indian Standard listed below are necessary adjuncts to the standard:

IS No.	*Title*
460 (Part 1) : 1985	Specification for test sieves: Part 1 Wire cloth test sieves (*second revision*)
1433 : 1965	Specification for beam scales

3 TERMINOLOGY

Field Moisture Equivalant, FME

The minimun water content expressed as a percentage of the weight of the oven-dried soil, at which a drop of water placed on a smoothed surface of the soil will not immediately be absorbed by the soil but will spread out over the surface and give it a shiny appearance.

4 APPARATUS

4.1 Evaporating Dish — a porcelain evaporating dish about 12 cm in diameter.

4.2 Spatula — a flexible spatula having a blade about 8 cm in length and 2 cm in width.

4.3 Dropper — a pipette, burette or similar device for adding water dropwise.

4.4 Containers — suitable containers, such as matched watch glasses which will prevent loss of moisture during weighing.

4.5 Balance — a balance sensitive to 0·01 g (*see* IS 1433 : 1965).

4.6 Pestle and Mortar

4.7 Oven — thermostatically controlled oven with interior of non-corroding material to maintain the temperature between 105 and 110°C

4.8 Sieves

4·75 mm IS Sieves, 2-mm IS Sieves and 425-micron IS Sieves [*see* IS 460 (Part 1) : 1985].

5 PREPARATION OF SAMPLE

5.1 The soil sample as received from the field shall be exposed to air at room temperature until dried thorougly. The aggregations shall then be thoroughly broken up in a mortar with a rubber-covered pestle or using a mortar and pestle made of soft wood. A representative sample of the amount required to perform the the desired test shall then be selected by the use of a sampler.

5.2 The portion of the air-dried sample selected for the purpose of tests shall be weighed and the mass recorded as the mass of the total test sample uncorrected for hygroscopic moisture. The test sample shall be separated by sieving with a 2-mm IS Sieve. That fraction retained on the 2-mm IS Sieve shall be ground in a mortar with a rubber-covered pestle until the aggregations of soil particles are broken up into the separate grains. The ground soil shall then be separated into two fractions by sieving with a 2-mm IS Sieve. The remaining portion of the material passing the 2-mm IS Sieve shall then be separated into two parts by means of a 425 micron IS Sieve. The fraction retained on the 425 micron IS Sieve shall be discarded. The fraction passing 425 micron IS Sieve shall be used for the test.

5.3 Soil Specimen

A specimen weighing about 30 g from the thoroughly mixed portion of the material passing 425 micron IS Sieve shall be taken for the test.

6 PROCEDURE

Place the air-dried specimen in an evaporating dish. Add distilled water to the specimen in small amounts and mix the specimen thoroughly after each addition of water. When the wetted soil forms into balls under manipulation

smooth the sample with a light stroke of the spatula and place a drop of water on the smoothed surface. If the drop of water disappears in 30 seconds, mix a few drops of water with the sample, and repeat the procedure until the drop of water placed on the smoothed surface does not disappear in 30 seconds but spreads over the smoothed surface leaving a shiny appearance (*see* Note). Then remove a small portion of the soil on which the last drop of water was placed and keep in a suitable container previously weighted (M_1). Determine the mass of the container and wet soil (M_2). Oven-dry the soil sample to constant mass at 105 to 110°C and record it (M_3).

NOTE — In case of some sandy soils, the shiny appearance may not be apparent. In such a case press the finger or spatula on the soil. When the finger or spatula is removed slowly, a film of moisture will raise slightly with it, if the FME has been reached.

7 CALCULATION

The Field Moisture Equivalent (FME) shall be calculated as follows:

$$\text{FME} = \frac{M_2 - M_3}{M_3 - M_1} \times 100$$

where

M_1 = Mass of container in g.

M_2 = Mass of container with set soil in g, and

M_3 = Mass of container and oven-dried soil in g.

8 REPORT

8.1 the test results shall be tabulated as given below:

1.	Mass of container (M_1), in g
2.	Mass of container with set soil (M_2), in g
3.	Mass of container and oven-dried sample (M_3), in g
4.	Mass of moisture present, in g
5.	Field moisture equivalent

Remarks:

8.2 The Field Moisture Equivalent shall be reported to two significant figures.

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